

Publication number : 06-194637

Date of publication of application : 15.07.1994

Int.Cl. G02F 1/1333 G02F 1/13 G02F 1/1339

5

Application number : 04-344608

Applicant : SHINETSU ENG KK

Date of filing : 24.12.1992

Inventor :

10 KATAGIRI KIYOO
SEKIKAWA TOSHIO
KASUYA KAZUMI
UCHIYAMA KAZUE

15 METHOD FOR ATTACHING GLASS SUBSTRATE FOR LIQUID CRYSTAL
DISPLAY PLATE

[Abstract]

Abstract:

20 PURPOSE: To provide the method for attaching glass substrates which does
not uselessly discard non-defective parts formed normally with patterns in
attaching of the glass substrates for a liquid crystal display plate.

CONSTITUTION: This method for attaching two sheets of the glass
substrates printed with electrodes constituting the liquid crystal display
25 plate consists in patterning the electrodes 1 of plural layouts and aligning

marks 2 on the lower substrate A, patterning the electrodes 3 and the aligning marks 4 as a size per 1 piece patterned to the lower substrate A on the upper substrate B and attaching the substrates by aligning the upper substrate B to the lower substrate A each time.

5

10

[Claims]

[Claim 1] A method for attaching a glass substrate for a liquid crystal display plate as a method for attaching two sheets of the glass substrates printed with electrodes constituting the liquid crystal display plate, the
5 method comprising: patterning electrodes and aligning marks on one glass substrate; patterning electrodes and aligning marks as a size per 1 piece patterned to said one substrate on the other substrate; and attaching the substrates by aligning the other substrate to said one substrate each time.

10

15

20

25

**[Title of the Invention] METHOD FOR ATTACHING GLASS SUBSTRATE FOR
LIQUID CRYSTAL DISPLAY PLATE**

[Detailed Description of the Invention]

[0001]

5 **[Field of the Invention]** The present invention relates to a method for attaching glass substrates (upper and lower electrode plates) constituting a liquid crystal display plate.

[0002] [Description of the Prior Art] In a liquid crystal display plate (LCD), liquid crystals are sealed inside a sealant by using spacers of several
10 micrometers between two sheets of glass substrates coated with transparent conductive electrodes, whereby the two sheets of the glass substrates can be stuck to each other by aligning marks without being misaligned.

[0003] However, in accordance with a conventional art, the two sheets of
15 the glass substrates are stuck to each other by using a multiple division method, in which a plurality of electrodes 5 and 6 having a predetermined pattern and aligning marks 7 and 8 are patterned on upper and lower substrates C and D, and the lower substrate is stuck by one mark-alignment and is divided and cut into a plurality of parts after the attaching process is
20 completed (refer to Figures 5 to 7).

[0004] [Problems to be Solved by the Invention] In the conventional method, the same or a variety of patterns are patterned on the upper and lower glass substrates. However, though a defect is found in parts of the plurality of patterns, the upper or lower glass substrate having the defective
25 parts is stuck, a liquid crystal display plate including the defective parts is

discarded after attaching the upper or lower glass substrate. However, when only one substrate of the upper and lower glass substrates has the defective parts, the other excellently patterned substrate is unnecessarily discarded. Therefore, a yield is degraded.

5 [0005] In addition, when the upper and lower substrates are stuck to each other, even though a plurality of patterns are formed on one sheet of the substrate, only two aligning marks disposed on a diagonal are aligned. Accordingly, each of products divided after the upper and lower substrates are stuck to each other is subject to non-uniform alignment precision. Since
10 the non-uniform alignment precision in the product causes the non-uniformity of color, it is hard to obtain a high quality product.

[0006] The present invention is devised in consideration of the aforementioned problems in the conventional art. An object of the present invention is to provide a method for attaching a glass substrate which
15 allows excellent parts formed normally with patterns not to be unnecessarily discarded.

[0007] [Means for Solving the Problem]

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is
20 provided a technical device provided in the present invention, a method for attaching two sheets of glass substrates printed with electrodes constituting a liquid crystal display plate, the method comprising: patterning a plurality of electrodes and aligning marks on one substrate; patterning the electrodes and the aligning marks as a size per 1 piece patterned to said one substrate
25 on the other upper substrate; and attaching the substrates by aligning the

other substrate to said one substrate each time.

[0008] As for the aligning marks performed on said one substrate on which a plurality of patterns are performed and on the other substrate divided according to each pattern, two kinds of marks (a defect controlling mark and
5 a fining-tuning mark) may be diagonally disposed or only one kind of marks may be diagonally disposed. In addition, said one substrate may be disposed under the other substrate or said one substrate may be disposed above the other substrate.

[0009] According to the device, since each small glass substrate
10 corresponding to each pattern formed on one glass substrate is aligned with and stuck to each pattern formed on said one glass substrate, the two substrates can be stuck to each other with high precision. Accordingly, when a defective pattern exists in the plurality of patterns performed on said one glass substrate, said the other glass substrate (small glass substrate) is
15 not stuck to a part formed with the defective pattern but to only a part formed with a normal pattern. Therefore, the other glass substrate is not required for the part formed with the defective pattern.

[0010] [Effect of the Invention] A method for attaching a glass substrate for a liquid crystal display plate as a method for attaching two sheets of the glass
20 substrates printed with electrodes constituting the liquid crystal display plate, the method comprises: patterning electrodes and aligning marks on one glass substrate; patterning electrodes and aligning marks as a size per 1 piece patterned to said one substrate on the other substrate; and attaching the substrates by aligning the other substrate to said one substrate each
25 time, so that the two substrates can be stuck to each other with high

precision and a high quality product can be manufactured. In addition, when a defective pattern exists in plurality of patterns performed on one glass substrate, the other glass substrate is not stuck to a part formed with the defective pattern but to only a part formed with a normal pattern.

5 Accordingly, a problem that the other glass substrate is unnecessarily used is solved and a yield can be improved.

[0011] [Embodiment] Hereinafter, a attaching method based on a construction that one substrate is disposed under the other substrate and the other substrate is disposed above said one substrate will be described
10 with reference to the accompanying drawings. A is one glass substrate disposed under the other glass substrate and B is the other glass substrate disposed above said one glass substrate. The lower glass substrate A is divided crosswise into four parts. Electrodes 1 of a predetermined pattern and aligning mark 2 are patterned on each of the four parts. Among four
15 blocks a, b, c and d, a right upper block c is defective (NG). The upper glass substrate B is about a quarter of the lower glass substrate A. An electrode 3 having a predetermined pattern and alignment marks 4 are patterned on the upper glass substrate B.

[0012] The upper glass substrate B and the lower glass substrate A are
20 stuck to each other by laying the upper glass substrate B on the lower glass substrate A. At this time, the upper glass substrates B are positioned only on the normally patterned blocks a, b and d. The upper glass substrates B are, one at a time, stuck to the lower glass substrate A by performing mark-alignment of the aligning marks 2 and the aligning marks 4. The lower glass
25 substrate B is not laid on the block c formed with the defective pattern but is

left as it is. (refer to Figures 2 and 3).

[0013] According to above-described procedure, the upper glass substrates B are stuck to the normally patterned blocks a, b and d of the lower glass substrate A. Then, as illustrated in Figure 4, the lower glass substrate A is cut and divided into the blocks a, b, c and d. Only the cut block to which the upper glass substrate B is stuck is used as a product, and the block C formed with the defective pattern is discarded.

[0014] Like the conventional art, spacers are spread on the surface of the above-described lower glass substrate A and a circumference of the upper glass substrate B is coated with a sealant. Thus, a description therefore is omitted in the drawings. In addition, in the above-described embodiment, one substrate is the upper part and the other substrate is the lower part, but according to the spirit of the present invention, it is needless to say that an opposite construction is also allowed.

[0015]

[Description of Drawings]

[Fig. 1] is a front view illustrating upper and lower glass substrates in the present invention.

[Fig. 2] is a front view illustrating a state that the upper glass substrates are stuck to parts formed with normal patterns on the lower glass substrate.

[Fig. 3] is a front view illustrating that the attaching of the upper and lower substrates to each other is completed.

[Fig. 4] is a front view illustrating blocks cut and divided after the upper and lower substrates are stuck to each other.

[Fig. 5] is a front view illustrating upper and lower glass substrates used in a

convention art.

[Fig. 6] is a front view illustrating a state that the attaching of the upper and lower substrates to each other is completed in accordance with the conventional art.

- 5 [Fig. 7] is a front view illustrating blocks cut and divided after the upper and lower substrates are stuck to each other in accordance with the conventional art.

[Explanation of Reference Numerals] A one (lower) glass substrate, B the other (upper) substrate, 1 and 3 electrodes of a predetermined pattern, 2 and

- 10 4 aligning marks